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Robustness of holographic particle tracking and characterization against defects in illumination HENRIQUE W. MOYSES, BHASKAR JYOTI KRISHNATREYA, DAVID G. GRIER, Department of Physics and Center for Soft Matter Research, New York University — Images obtained with holographic video microscopy can be interpreted with predictions of the Lorenz-Mie theory of light scattering to track individual colloidal particle's motions with nanometer resolution in three dimensions over ranges extending to hundreds of micrometers, to measure their radii with nanometer resolution, and to characterize their complex refractive indexes with part-per-thousand precision. In this work we numerically and experimentally investigate how defects in the illumination system, such as divergence and tilt of the illuminating laser beam, and spherical aberrations in the optical train affect the measured properties of the particles. We show that for the usual conditions where the experiments are performed divergence and tilt of the laser beam do not affect the measured parameters significantly, while spherical aberration can introduce significant errors.

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